REMARKS

Claims 1 to 15 are all the claims pending in the application, prior to the present amendment.

Claims 6 and 11-15 have been objected to as being in improper form because a multiple dependent claim cannot depend from any other multiple dependent claim. The Examiner states that claims 6 and 11-16, therefore, have not been treated on the merits.

In response to this objection, applicant has amended claim 6 to depend from claim 1 only, and have amended claims 11-15 so that they depend from claim 9 only.

In view of the above, applicant requests withdrawal of this objection.

Claims 2-5 have been rejected under the second paragraph of 35 U.S.C. § 112 as indefinite.

The Examiner states that claims 2 and 3 recite a number of defects and projections, respectively, "per surface," but the claims fail to define what surface or the size of such surface. The Examiner states that, therefore, it is unclear what is meant to be encompassed by the claims in view of the fact that the calculation is relative.

In response, applicant has amended the term "per surface" in claims 2 to 3, from which claims 4 to 5 depend, to "per surface corresponding to a surface on one side of a substrate having a diameter of 2.5 inches." Support for this amendment is found in Examples 1 to 5 and Table 3 of the present specification.

In view of the above, applicant requests withdrawal of this rejection.

Claims 1-3 have been rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent Appln. Pub. No. 2002/0027732 to Arita et al.

Applicant submits that Arita et al '732 do not disclose or render obvious the subject matter of claims 1-3 and, accordingly, requests withdrawal of this rejection.

The present invention as set forth in claim 1 as amended above is directed to a substrate for use in a perpendicular magnetic recording medium, comprising a blank substrate and a soft magnetic layer comprised of a film of phosphorus- or boron-containing cobalt alloy formed on the blank substrate by electroless plating, the electroless plated film of the cobalt alloy having surface roughness Ra in the range of 0.05 nm to 1 nm.

The electroless plated film of the cobalt alloy in the present invention is a soft magnetic layer, as disclosed, for example, at page 7, lines 6-7, and does not function as a recording layer. Applicant has amend claim 1 to recite that the film of phosphorous- or boron-containing cobalt alloy is a soft magnetic layer.

Further, the present specification states that the electroless plated film does not contain a magnetic wall. Applicant has added a new dependent claim 16 to state that the electroless-plated film does not contain a magnetic wall.

The Examiner particularly refers to the abstract and paragraphs [0194] and [0215] of Arita et al '732.

Paragraph [0194] of Arita et al '732 discloses a Co alloy magnetic layer that functions as a recording layer that can be made from CoCrPtB and, thus, it is a boron-containing cobalt layer. Paragraph [0194] discloses that the thickness of the Co magnetic layer is preferred to be at least

5 nm, more preferably at least 10 nm, and preferably at most 50 nm, more preferably at most 30 nm.

As discussed above, the electroless plated film of the cobalt alloy in the present invention is a soft magnetic layer and does not function as a recording layer. In view of the amendment to claim 1 to recite that the film of phosphorous- or boron-containing cobalt alloy is a soft magnetic layer, applicant submits that Arita et al '732 do not disclose or suggest the subject matter of claim 1.

Further, in paragraph [0218], Arita et al '732 disclose, as a method for forming each layer of the magnetic recording medium, that various methods may be employed, such as direct current sputtering, high frequency sputtering, ECR sputtering or physical vapor deposition. Arita et al '732 do not disclose that the CoCrPtB alloy of paragraph [0194] can be formed by electroless plating. Accordingly, since the CoCrPtB alloy in paragraph [0194] is not formed by electroless plating, this is another reason why the CoCrPtB alloy of Arita et al '732 differs from and does not suggest the soft magnetic, electroless plated film layer set forth in the present claims.

Arita et al '732 further disclose in paragraphs [0189] and [0190] that a soft magnetic layer may be provided in some cases between the base layer and the recording layer, and that NiFe is a preferred material for the soft magnetic layer. The NiFe material of Arita et al, however, does not suggest the electroless plated P- or B-containing cobalt alloy film.

In paragraphs [0177] to [0178], Arita et al '732 disclose the forming of a metal layer, such as NiP or NiAl, on the surface of the substrate by means such as electroless deposition

sputtering, etc. This is the only disclosure of an electroless deposition in Arita et al '732, and is not a disclosure or suggestion of an electroless plating of a soft magnetic layer of a P- or B-containing cobalt alloy film.

In addition, Arita et al '732 discloses in paragraph [0215] that the surface roughness of the "medium" is "at most 3 nm," and "preferably at most 1.5 nm." Example 1 of Arita et al '732 discloses a surface roughness of 0.5 nm and Example 3 discloses a surface roughness of 0.6 nm. The surface roughness of the medium in Arita et al '732, however, is not the surface roughness of the electroplated film, but rather, as disclosed in paragraph [0215], is the surface roughness of the "medium excluding the lubricant layer." This surface roughness would be the surface roughness of the protective layer which is preferably on the magnetic layer (see paragraph [0205] and Examples 1 and 3) or the surface roughness of the magnetic recording layer which is not formed by electroless plating, and is not the surface roughness set forth in claim 1.

In view of the above, applicant submits that Arita et al '732 do not disclose or render obvious the subject matter of claims 1-3 and, accordingly, requests withdrawal of this rejection.

Claim 7 has been rejected under 35 U.S.C. § 102(b) as anticipated by JP 10-74318.

Applicant submits that JP 10-74318 does not disclose or render obvious the subject matter of claim 7 and, accordingly, requests withdrawal of this rejection.

Applicant notes that JP '318 corresponds to U.S. Patent 5,980,997 that was cited by applicant in the Information Disclosure Statement filed on October 17, 2005.

Claim 7 is directed to a method for the production of a substrate for use in a perpendicular magnetic recording medium, comprising a step of forming on a blank substrate a

soft magnetic layer comprised of a film of phosphorus- or boron-containing cobalt alloy by electroless plating and a step of polishing a surface resulting from the step of forming the film by the plating.

Thus, applicant has amended claim 7 to recite that the film of phosphorous- or boron-containing cobalt alloy is a soft magnetic layer.

The Examiner states that JP '318 discloses a substrate for use in a magnetic recording medium comprising a blank substrate and a film of phosphorous or boron-containing cobalt alloy formed on the blank substrate by electroless plating followed by polishing. The Examiner refers to pages 5, 9, 11 and 20 and claims 14 and 15. The page numbers that the Examiner refers to are the page numbers of the English translation of JP '318 that appears at the end of the copy of JP '318 that was submitted to the Examiner. These page numbers appear at the bottom of the pages.

Referring to the English translation, page 5 discloses that an NiP layer is plated onto an initiation layer that facilitates electroless plating of NiP and that is deposited on a glass substrate, and that the electroless plated NiP layer is then polished and laser textured. The initiation layer can be a thin Zn layer.

JP '318 further discloses at page 20 that instead of the plated NiP, other materials can be plated onto the substrate for laser texturing, for example, CoP or FeP.

JP '318 does not disclose an example that employs a plated CoP layer.

The substrate for use in the magnetic recording medium disclosed in JP '318 is a non-magnetic substrate, and does not contain the soft magnetic layer of claim 7. Since a magnetic

layer such as layer 122 or the like is formed on the substrate in JP '318 for use in the magnetic recording medium, it is necessary to avoid the adverse effect on the magnetic layer thus formed. Therefore, in the case of the invention disclosed in JP '318, the blank substrate and the film of phosphorus or boron containing cobalt alloy formed on the blank substrate are both non-magnetic. Accordingly, the NiP plated layer disclosed at page 5, or the CoP material disclosed at page 20, as materials and forming the film are both non-magnetic.

It is to be noted that, in order to make a NiP alloy non-magnetic, it is necessary to adjust the P component in the composite of the alloy at a concentration higher than about 11%. Example 1 of JP '318, which is the only working Example of an NiP layer in JP '318, has a P concentration of 15.5 wt %.

In contrast, the substrate for use in a perpendicular magnetic recording medium according to the present invention as set forth in claim 7 comprises a non-magnetic substrate and a soft magnetic film of cobalt alloy, such as CoP, formed on the non-magnetic substrate. The soft magnetic film enables magnetic recording and reproduction by a magnetic head on a magnetic recording layer formed on the soft magnetic film.

The film of phosphorus- or boron-containing cobalt alloy formed on the blank substrate in JP '318 is entirely different, in physical properties, application, and purpose, from the soft magnetic film of cobalt alloy, such as CoP, of the present invention.

In view of the above, applicant submits that JP 10-74318 does not disclose or render obvious the subject matter of claim 7 and, accordingly, requests withdrawal of this rejection.

Claims 1-5 and 8-10 have been rejected under 35 U.S.C. § 103(a) as obvious over JP '318.

Applicant submits that JP 10-74318 does not disclose or render obvious the presently claimed invention as set forth in claims 1-5 and 8-10 and, accordingly, requests withdrawal of this rejection.

The Examiner recognizes that JP '318 does not disclose various aspects of these claims, such as the surface roughness recited in claim 1, the number and size of projections and depressions recited in claims 2 and 3, and the amounts recited in claims 4 and 5.

The Examiner argues that it would have been obvious to determine the optimum amounts for these variables through routine experimentation. The Examiner states that the claimed surface roughness is typical in the art, and the amounts of P or B are known to be a result effective variable.

In response, as discussed above, claim 1, from which claims 2-5 depend, and 7, from which claims 8-10 depend, each recite a soft magnetic layer comprised of a film of phosphorous- or boron-containing cobalt alloy formed on a blank substrate by electroless plating. As discussed above in connection with the 102(b) rejection of claim 7 over JP '318, such a soft magnetic layer is not disclosed or suggested by JP '318.

Further, with respect to claims 1 to 3, and the Examiner's arguments that it would have been obvious to determine the optimum amounts for the variables such as surface roughness and surfaced defects through routine experimentation, applicant points out that the invention disclosed in JP '318 is different from the present invention with respect to the surface finishing of the plated film.

In the case of JP '318, a portion of the disk surface is subjected to texturing with a laser beam for the purpose of forming a "contact- start-stop zone" (CSS zone) where the read-write head takes off and lands. For this reason, the surface of the plated film in JP '318 is subjected to the texturing. The remainder of the disk that is not subjected to the texturing is used as a "data zone" for recording data. See page 3, lines 18 to 25 of the English specification corresponding to JP '318.

In contrast, in the case of the present invention, an entire surface of the plated film is subjected to polishing for the purpose of making the entire surface of the plated film highly smoothed. See claim 7 and page 2, line 28 to page 3, line 1 of the present specification.

In this way, the invention disclosed in JP '318 is different from the present invention with respect to the surface finishing performed on the plated film. Therefore, JP '318 does not teach the subject matter recited in claims 1 to 3 of the present application.

With respect to claims 4 and 5, which recite the amounts of phosphorous and boron, the Examiner argues that it would have been obvious to determine the optimum amounts for these variables through routine experimentation.

As described above, in the case of the invention disclosed in JP '318, the film of phosphorus or boron containing cobalt alloy formed on the blank substrate is non-magnetic.

In contrast, the electroless plated film of the cobalt alloy, such as CoP, which forms the substrate for use in a perpendicular magnetic recording medium of the present invention, is a soft magnetic layer. Since it has the properties as soft magnetic material, the electroless plated film of the cobalt alloy of the present invention should have a phosphorus (or boron) content in a predetermined range. See page 7, lines 2 to 12 of the present specification. Applicant has added

new dependent claims 17-19 which recite different ranges for the phosphorous content in accordance with the disclosure at page 7.

In this way, since the physical properties are different, JP '318 does not teach the subject matter recited in claims 4 and 5 of the present application or new claims 17-19.

With respect to claims 9 and 10, the Examiner states that she is taking the position that the claimed polishing liquid is a conventional polishing liquid typically used in the art, and that it would have been obvious to one of ordinary skill in the art to use such a composition at the time of the invention.

However, since JP '318 describes that it is impractical to zone texture a glass substrate by chemical etching, as disclosed at page 7, line 25 to page 8, line 2 of the English translation of JP '318, that is, to form the CSS zone on only a portion of the surface of the disk, JP '318 does not teach or suggest the subject matter recited in claims 9 and 10.

In view of the above, applicant submits that JP 10-74318 does not disclose or render obvious the presently claimed invention and, accordingly, requests withdrawal of this rejection..

Claims 1-4 have been rejected under 35 U.S.C. § 103(a) as obvious over JP 58-157106.

Applicant submits that JP 58-157106 does not disclose or render obvious the presently claimed invention as set forth in claims 1-4 and, accordingly, requests withdrawal of this rejection.

The Examiner relies on the abstract of JP '106 for its teaching of an electroless plated NiCoP alloy magnetic film on a non-magnetic substrate. The NiCoP alloy magnetic film is comprised of 55 to 75 weight% Ni, 15 to 41 weight % Co, and 3 to 8 weight % P.

The abstract states that the alloy magnetic film is a vertically magnetized film having a large anisotropic constant and a large coercive force. The NiCoP alloy magnetic film in JP '106 is a recording layer, and is not a soft magnetic film as in the present invention. For this reason alone, JP '106 does not disclose or suggest the subject matter of claims 1-4.

In addition, with regard to the content of Ni, when Ni is used in the soft magnetic film of the present invention, it is 20 mass% or less in the present invention, as disclosed at page 6, lines 1 to 3 of the present specification, whereas, in JP '106, it is in a range of about 55 to 78 wt%. Therefore, the present invention is different from JP '106 in this respect.

With respect to the surface roughness recited in claim 1, the Examiner takes the position that it would have been obvious to employ such a value because it is well known that a smooth or low surface roughness is desirable.

However, JP '106 discloses a composition of a perpendicular magnetic film that forms a recording medium, but fails to disclose a structure of a substrate and a composition of the substrate for forming a magnetic film.

Further, JP '106 also fails to disclose how much smoothness is required for the substrate for forming the magnetic film so as to stabilize a run of the magnetic recording of the recording head.

In contrast, in the present invention as set forth in claims 1-4, the composition and physical properties of the underlayer on which the perpendicular magnetic film is formed are defined. Moreover, in the present invention as set forth in claims 1-4, the degree of smoothness of the underlayer, which is required to stabilize a run of the recording head during the course of the magnetic recording, is clarified and recited.

In view of the above, applicant submits that JP 58-157106 does not disclose or render obvious the subject matter of claims 1-4 and, accordingly, requests withdrawal of this rejection.

Claims 1-5 and 7-10 have been rejected under 35 U.S.C. § 103(a) as obvious over U.S. Patent 5,929,759 to Arita et al in view of Arita et al '732 and JP '318.

Applicant submits that U.S. Patent 5,929,759 to Arita et al, Arita et al '732 and JP '318 do not disclose or render obvious the presently claimed invention and, accordingly, requests withdrawal of this rejection.

The Examiner relies on Arita et al '759 for a teaching of providing an NiP underlayer by electroless plating to a thickness of 10 to 20 microns on the substrate, and then surface polishing the NiP layer the impart a surface roughness of not more than 1 nm. The Examiner refers to column 5, lines 3-17 and Example 32. See also, for example, Examples 1-3, Examples 18-22 and Examples 23-26 for a similar disclosure of polishing a NiP plated film to a surface roughness of not more than 1 nm.

The Examiner further notes that Arita et al '759 disclose that the magnetic recording layer can be formed from CoP or other cobalt alloys to a thickness of 30 to 70 nm by electroless plating.

The Examiner recognizes that Arita et al '759 do not specifically teach that the underlayer is a cobalt alloy as claimed, or that the disclosed cobalt alloy magnetic layer also has a surface roughness as set forth in the present claims.

The Examiner argues that the surface roughness is a result effective variable and, therefore, it would have been obvious to employ a low surface roughness.

In response, applicant first points out that Arita et al '759, at column 4, lines 33-36, state that the electroless plated NiP underlayer is a non-magnetic layer. This NiP non-magnetic layer differs from and does not suggest the soft-magnetic cobalt-containing layer recited in the present claims.

Further, the CoP layer of Arita et al '759 is a recording layer, and is not a soft magnetic layer as recited in the present claims. Accordingly, neither the NiP layer or CoP layer of Arita et al '759 disclose or suggest the soft magnetic layer set forth in the present claims.

Further, according to Arita et al '759, in a case of using a substrate where the height or the density of projections formed by the energy beam are low or small, there is, in a state in which the magnetic recording medium and the magnetic head are partially in contact with each other, the advantage that sticking is less caused and frictional coefficient is reduced as compared with a case of using a simply mirror-finished substrate. See column 5, lines 18-24. Arita et al '759 also describe that, if the height of the projection is less than 1 nm, the projection is buried in a fine unevenness inherent to the substrate, thereby failing to attain an intended advantageous effect. See column 5, lines 43-48.

In contrast, in the case of the present invention, an entire surface of the plated film is subjected to polishing for the purpose of making the entire surface of the plated film highly smoothed. See claim 7 and page 2, line 28 to page 3, line 1 of the present specification.

In this way, with respect to the surface finishing of the plated film, the invention disclosed in Arita et al '759 is different from the present invention. Accordingly, Arita et al '759 does not teach the subject matter recited in claims 1 to 3 of the present application.

The Examiner further states that JP '318 discloses that a cobalt alloy comprising B or P can be substituted for an NiP alloy. The Examiner argues that the amount of B or P can be determined by routine experimentation. As discussed above, the NiP alloy of JP '318 and the B- or P-containing cobalt alloy of JP '318 are non-magnetic layers, just as the NiP alloy of Arita et al '759, and are not the soft magnetic layer of the present claims. Accordingly, the substitution of the non-magnetic B- or P-containing cobalt alloy of JP '318 for the NiP alloy in Arita et al '759 would not lead one of ordinary skill in the art to the present claims.

Further, with respect to the Examiner's reliance on the electroless plated cobalt alloy magnetic layer having a thickness of 30 to 70 nm disclosed in Arita et al '759, applicant again points out that claim 1 recites that the electroless plated film in the present invention is a soft magnetic layer, but the electroless plated cobalt alloy magnetic recording layer of Arita et al '759 is not a soft magnetic material. Thus, the electroless plated cobalt alloy magnetic layer having a thickness of 30 to 70 nm disclosed in Arita et al '759 is not a soft magnetic material that satisfies the present claims.

In this way, the electroless plated cobalt alloy magnetic layer disclosed in Arita et al '759 is entirely different from the soft magnetic film of cobalt alloy, such as CoP, of the present invention with respect to physical properties, application, and purpose.

Accordingly, the composition recited in claims 4 and 5 of the present application is not suggested by the teachings of Arita et al '759 and JP '318.

With respect to claims 8-10, the Examiner recognizes that Arita et al '759 do not specifically teach the claimed chemical polishing liquid or polishing depth, but argues that the claimed polishing liquid is a conventional polishing liquid, and that it would have been obvious

to determine the optimum polishing depth to provide the desired surface roughness and resulting layer thickness taught by Arita et al '759.

In the invention disclosed in Arita et al '759, a portion of the surface of the disk is textured with an energy beam for the purpose of forming a CSS zone, where the read-write head takes off and lands. See col. 1, lines 9 to 18 and claim 1 of Arita et al '759.

It is deemed difficult to such an extent that it is non-workable to divide the surface of the disk into the CSS zone and the data zone and to texture each zone in different degrees by using a chemical etching process. This is the same as for JP '318.

Accordingly, Arita et al '759 do not teach the subject matter recited in claims 8 to 10 of the present application.

In view of the above, applicant submits that U.S. Patent 5,929,759 to Arita et al, Arita et al '732 and JP '318 do not disclose or render obvious the presently claimed invention and, accordingly, requests withdrawal of this rejection.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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